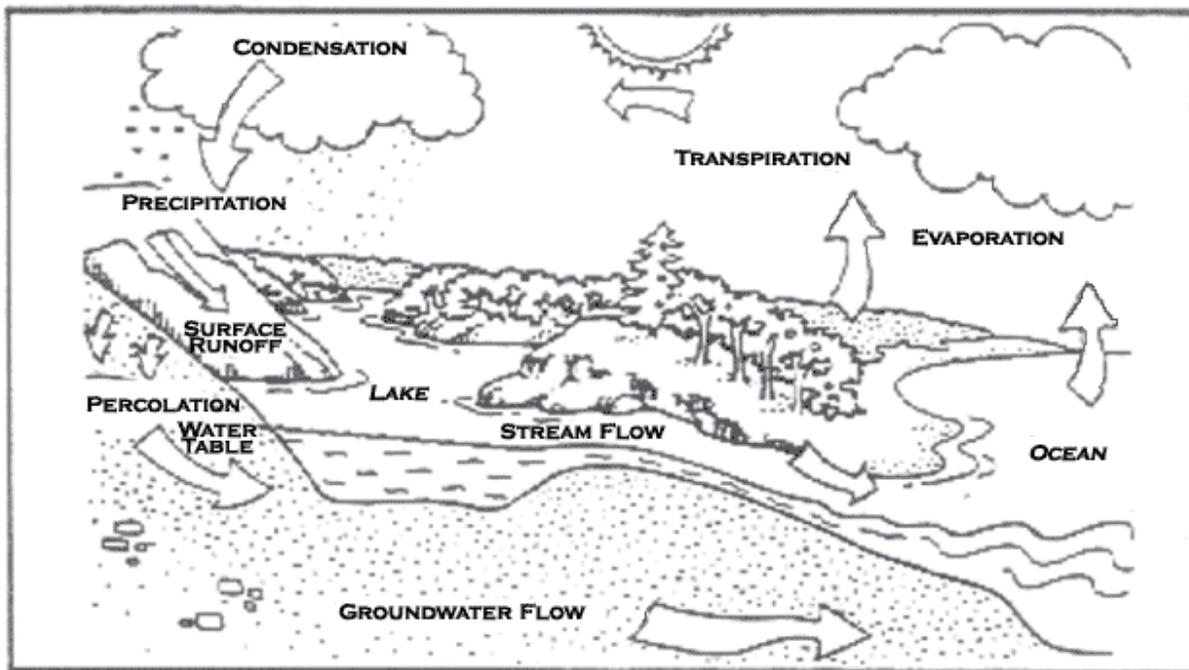


Teacher's Notes
Solid, Liquid, Gas !
The Water Cycle

Almost 75% of the earth is covered in water. Every molecule of water that was present when the earth was formed is still present today. Just think, the water you used to shower this morning is the same water that dinosaurs may have drank! The same water has been transferred time and time again from the oceans, into atmosphere, dropped upon the land and transferred back to the sea. This endless circulation of water is known as the *Hydrologic Cycle* or the *Water Cycle*.

The Water Cycle is an ongoing natural system that works like a machine, distilling and pumping water through its channels. Water is always in motion. From the earth to the atmosphere, water moves through *evaporation* and *transpiration*. From the atmosphere to the earth it moves as *condensation* and *precipitation*. Between points on earth, water moves as *stream flow* or as *groundwater movement*. The sun supplies energy. This, in combination with the force of gravity, keeps water moving. As a cycle, the global water system has no beginning and no end. It does not lose or gain water.



Solid, Liquid, Gas!

Overview of Activity:

Students learn that water can be found in three states - solid, liquid and gas. They describe the characteristics of each state and observe melting, freezing and evaporation.

Outcomes:

- Investigate the physical properties of water as solid, liquid and gas
- Observe water-changing state
- Introduce the water cycle

Purpose:

Students identify three states of water - water as a solid, liquid and gas. They observe water as it melts and as it evaporates. Students are introduced to the idea of water recycling itself.

<p>Materials Needed: ?4 ice cubes ?2 glasses of water (1 is frozen) ?tea kettle ?Solid, Liquid and Gas worksheets ?Preparations: ?Freeze a glass of water before activity ?Procedure: ?1. Display the ice cubes, glass of water and kettle with boiling water in front of class. Ask the class to identify each. Ask the class, which of the three is hottest, which is coldest. ?2. Ask students to consider what would happen to the ice cubes if they were left in the classroom and not returned to a cold area. ?3. Leave the ice cubes on a tray at room temperature and have students observe them as they melt. Are they changing shape? What do we call it when ice cubes become water?</p>	<p>4. Using a glass of water, ask the class to identify if it is a solid or liquid. 5. Discuss what could happen to water in a liquid state - it can change into a gas or it can freeze. 6. Using the frozen glass of water show how water has frozen into the shape of the glass. What is this process called? 7. Now pour a glass of water into the teakettle. Explain that as water is heated, it begins to boil, when it reaches 100°C then it turns into a gas state- steam - which is a clear gas. The steam quickly cools forming a vapour cloud. 8. Return to the melting ice cubes. Have they begun melting? Ask students to explain what is happening - the frozen water is turning to liquid water. As it melts, is it changing shape? Why?</p>
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Observations:

Students observe water in three states (solid, liquid, gas) and water as it changes from solid to liquid, from liquid to solid and from liquid to gas.

Discussion:

1. Is an ice cube a solid, liquid or gas?
2. What is an ice cube made of?
3. If an ice cube is left in a warm room, what will happen to it?
4. At what temperature does water freeze?
5. When you drink a glass of water, is this water solid, liquid or gas?
6. What will happen to the glass of water if it is placed in a very cold area? Will its shape change? Why?
7. What happens to water if it is heated?
8. At what temperature does water change from a liquid to a gas?

Conclusions:

Upon completing this activity, students will be able to describe the characteristics of water in three states, and define the processes of freezing, melting and evaporation.

Solid, Liquid, Gas - Worksheet		
Teacher's Note		
1. Label each of the pictures below:		
solid frozen water	Liquid water	Gas water vapor
2. Finish the sentence below each picture:		
The ice cube is <i>melting.</i>	At room temperature water is a <i>liquid.</i>	When water is boiled it becomes a <i>gas -water vapour.</i>
3. Draw what happened when the ice cubes were left at room temperature:		
4. Where in your community and in nature have you seen frozen water become a liquid? <i>snow melting food defrosting ice melting etc.</i>		
5. In this experiment, what was used to show that water can change from a liquid to a gas? Explain your answer using words and diagrams. <i>The teakettle was used to boil the water, which causes a change from a liquid to a gas.</i>		
6. At what temperature does water change from a liquid to solid? What is this called? <i>Water changes from a liquid to solid at 0°C. This process is called freezing.</i>		
7. At what temperature does water change from a liquid to a gas? What is this process called? <i>Water changes from liquid to gas at 100°C. This process is called evaporation.</i>		
8. Could the ice cubes become steam? How? Use pictures to explain your answer. <i>The ice cubes could become steam, if they were heated to 100°C. The ice cubes first melt into a liquid state, and then they begin to evaporate, becoming steam and then water vapour.</i>		

Solid, Liquid, Gas ! Activity Sheet

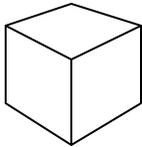
1. Label each of the pictures:







2. Finish the sentence below each picture:



The ice cube is
_____.



At room temperature water
is a _____.



When water boiled it becomes
a _____.

3. Draw what happened when the ice cubes were warmed up in the room:

Before

After

4. Where in your community have you seen frozen water becoming a liquid?

5. In this experiment, how did we show water changing from a liquid to a gas?
Explain your answer using words and diagrams.

Before:	After:
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6. At what temperature does water change from a liquid to a solid? What is this process called?

7. At what temperature does water change from a liquid to a gas?
What is the process called?

8. Could the ice cubes become steam? How? Use pictures to help explain your answer.

Pictures: